University of Bahrain
College of Information Technology
Department of Computer Science
ITCS 341: Object Oriented Systems
Semester I, 2005-2006

Test #1

Date: 25/10/2005 Time: 10:40-11:40

Question 1 (4 Points)

Define **four** attributes and **four** operations that describe the characteristics and behavior in an abstraction of a "car" from the point view of:
(a) A driver
(b) A car agent that sells cars.

Question 2 (10 Points)

Using the code below, draw an object diagram to show the effect of executing the main method of class Testing.

```
public class Testing
{
  public static void main(String
args[])
 {
  Person p= new
Person("111","Amal");
  House h1= new House(123);
  House h2= new House(234);
  p.addHouse(h1);
  p.changeHouse(h1,h2);
 } }//end class Testing
class House
{ private int num;
 private Person owner;
 public House(int n)
 {   num=n;
     owner=null; }
 public void setOwner(Person p)
 {        owner=p; }
 public Person getOwner()
 {        return owner;  }
 public int getNum()
 {        return num;    }
}//end class House
```

```
class Person
{ private String id, name;
  private House houseList[];
  private int next;
  public Person(String i,String n)
  {  id=i;     name=n;
     houseList= new House[5];
     next=0;  }
  public void addHouse(House
    newHouse)
  {   houseList[next]= newHouse;
    newHouse.setOwner(this); next++;}
  public void changeHouse(House
      oldHouse, House newHouse)
  {int pos=-1;
   for (int i=0; i<next; i++)
    if(houseList[i].equals(oldHouse))
    {     pos=i; break;  }
    if (pos != -1)
    { houseList[pos].setOwner(null);
      houseList[pos]= newHouse;
      newHouse.setOwner(this); } }
public String getId(){ return id;}
public String getName()
{ return name;}}//end class Person
```

Question 3 (26 Points)

Read the statement of the problem below and answer the following questions:

A car mechanic has an id and name. Each mechanic may repair many cars. A car may be repaired by different mechanics at different time. Each repair is done at specific date and time, has duration and repair cost. The date and the time of the repair are set at the start of the repair.
Each car has car number, make and model.
A mechanic should be able to update the duration of a car repair. The mechanic knows all his repairs but the car does not know its mechanic.
Classes Date and Time are included in the code below.

1) Draw a class diagram that shows the repairs relationship between a mechanic and a car. You may add any class if necessary?

2) Show in the above class diagram the cardinality of the classes involved in the repairs relationship.

3) Add to both classes Mechanic and car below, the attributes and methods that support the repair relationship. Add any necessary classes.

```
class Mechanic
{
      …….
      ……..
     public Mechanic(long id, String name)
     {
      ……..
     }
      public void repair(……..)
      {
            ……..
      }
      public void updateDuration(…….)
      {
            ……..
      }

}// End class Mechanic
```

Question 3 (continue)

```
class Car
{
      ……….
      public Car(String carNum, String make, String model)
       {
           ……..
       }
      public String getCarNum()
      {    return carNum; }
      public String getMake()
           {    return carNum; }
      public String getModel()
           {    return model;  }

      }//End class car

class Date
{
         private int day, month, year;
         public Date(int theDay, int theMonth, int theYear )
       {
            month = theMonth;
            year = theYear;
            day = theDay;
          }

} // end class Date

class Time
{
   private int second, minute, hour;
   public Time( int s, int m, int h )
   {
      second=s;
      minute=m;
      hour=h;
 }} // end class Time
```